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Summary for 1957

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Breeding and Variety Trials in Relation to Cantaloup Crown Blight, 1957

Dr. R. E. Foster
Horticulture Department
Arizona Agricultural Experiment Station
Cooperating with U.S.D.A. - A.R.S. -
Horticultural Crops Research Branch

A. Breeding

The cantaloup breeding program was continued in 1957 as before, on both the Mesa and Yuma experiment stations. Almost entirely, emphasis was placed upon discovery, development and intensification of crown blight resistance.

All possible sources of material have been screened for several years. Selections for resistance to crown blight have been continued; partly resistant or tolerant lines have been used in breeding activity. All types of muskmelons are now being used because it is felt that the crown blight resistance is of primary importance and that improvement for horticultural characteristics can be made rapidly once resistance is established.

All breeding strains were evaluated for reaction to "grey-green" crown blight at Mesa by the leaf-count method, summer of 1957. That progress has been made in the principal aim of the program can best be realized through consideration of these data.

A portion of the results is presented in Table I. It is interesting to note that partial resistance has been found in many strains of muskmelons.

The fall breeding program included selfing of all promising lines at Yuma and crossing of desirable parents at Mesa.

Not shown in the table are several strains continued because they are extremely susceptible to crown blight. These have been maintained for use in fundamental research on the disease.

B. Variety Trials

In variety tests conducted by the Horticulture Department in previous years, at both Yuma and Mesa, Arizona, the breeding strain CBR No. 1 has always shown to be the most resistant to cantaloup crown blight.

In 1956, CBR No. 1 was planted in the Imperial Valley in a test conducted by R. A. Kortsen. While the trial was not replicated, the plots were large, and it was quite evident upon inspection that CBR No. 1 showed a more severe form of crown blight in Imperial Valley than the varieties PMR No. 450 or SR No. 91. To check on this apparent discrepancy, well replicated trials were planned for Mesa, Arizona; Yuma, Arizona and Imperial Valley in 1957.

TABLE I. Muskmelon Strains Bred for Crown Blight Resistance

% of Affected Leaves at Fruit Maturity on Same Progeny in the Program

Code No.	Parent Line	% of C. B.	Code No.	Parent Line	% of C. B.
38	Foreign Intro.	0.0	368	Foreign Intro.	7.8
49	Rio Sweet	1.2	52	Ariz. Sunrise	14.5
50	Rio Sweet	1.5	55	PMR No. 36841	13.3
79	Foreign Intro.	3.2	72	Persian	10.5
97	Honey Dew	0.4	74	Honey Dew	10.0
160	U of A Breed.	3.8	78	Foreign Intro.	10.5
161	U of A Breed.	0.0	88	Honey Dew	13.8
238	Rio Sweet	1.1	95	Casaba	11.6
263	U of A Breed.	2.6	109	Foreign Intro.	11.9
345	U of A Breed.	4.8	140	Honey Dew	11.2
15	Ariz. Sunrise	8.7	150	U of A Breed.	10.8
51	Ariz. Sunrise	8.0	152	U of A Breed.	10.3
60	Ariz. Sunrise	9.7	163	U of A Breed.	10.8
81	Casaba	6.8	183	U of A Breed.	11.4
94	Pennsweet	9.3	210	U of A Breed.	14.6
100	SR No. 91	5.4	218	U of A Breed.	12.9
164	U of A Breed.	9.3	251	U of A Breed.	11.3
165	U of A Breed.	9.8	330	U of A Breed.	10.6
166	U of A Breed.	8.0	344	Foreign Intro.	12.2
216	PMR No. 6	6.6	346	U of A Breed.	13.4
235	Shumway Giant	9.5	352	U of A Breed.	14.6
237	Rouw's No. 45	7.9	371	Foreign Intro.	13.3
247	U of A Breed.	8.5		PMR No. 45	40.7
257	Foreign Intro.	8.4		PMR No. 6	44.0

For lack of space, the Imperial Valley test was planted for observation only, with a minimum number of replicates. No data from that trial is at hand. Both the Yuma test and the Mesa test were planted in a 9 x 9 Latin square design on Experiment Station land. In the Mesa test, however, the counts were made on all plants in each variety replicate. These counts were made by recording the total number of leaves on both the main runner of the plant, and the largest and lowest lateral runner. At the same time, the number of leaves showing 50% of the area affected were recorded as crown blighted leaves. Comparing these two figures gave the percent of damage due to crown blight. These data were analyzed and are given in Table II.

Behavior of cantaloups on the University of Arizona, Mesa Experiment Station in 1957 was quite unusual. On the east portion of the farm, where irrigation studies and insecticide studies were made, crown blight seemed to follow a more usual pattern for this area. Development of the disease was gradual and the predominant symptom was a brown sectoring type, along with some indication of the yellow type of crown blight.

On the west side of the farm, however, where the variety trials and the breeding stocks were planted, crown blight symptoms were predominantly of the gray-green type and severe damage occurred in a relatively short period of time. In some cases, it was evident that symptoms appeared overnight. Large differences were apparent visually in the variety trials and undoubtedly, the differences in

crown blight recorded in the data were the result of different reactions to this gray-green type of symptom development.

It is very interesting to note that the variety behavior closely paralleled that observed in Imperial Valley last year, and the results obtained from this test are at variance with those obtained previously in the same area. These data and comparisons seem to indicate very strongly that more than one type of crown blight is involved. It is interesting to note that while CBR No. 1 is apparently more susceptible than PMR No. 450 or SR No. 91, to this gray-green type of crown blight, it still shows more resistance than PMR No. 45 or PMR No. 6.

No statistical comparisons have been made as yet between the two methods of counting, that is, counting main runners versus counting lateral runners. For some time it was thought that crown blight caused a killing of the runner tips. For this reason, the number of dead tips occurring in each plot were also recorded and compared with the total number of runners examined. The percent of dead tips figures were obtained in this manner, were analyzed, and are presented in the tables. It is quite apparent that the severity of tip killing does not follow the same pattern as the severity of crown blight, and while the data have not been calculated as yet, it is more than likely that no correlation will be found between the number of dead tips and the number of leaves affected on a runner. From these data, it is to be supposed that runner tip killing is a function of some other trouble.

TABLE II. Cantaloup Varieties Tested with Special Reference to Crown Blight

MESA - SUMMER OF 1957

% of Crown Blight - Main Runner

Variety	% of C.B.	Duncan's* .05
PMR No. 450	26.7	a
PMR No. 88	27.9	a
56913M	28.5	a
SR No. 91	30.0	a
Ariz. Sunrise	42.1	b
CBR No. 1	42.4	b
PMR No. 45	48.9	c
Netted Gem	49.6	c
PMR No. 6	53.4	c

% of Crown Blight - Lateral Runner

Variety	% of C.B.	Duncan's .05
PMR No. 450	23.5	a
PMR No. 88	25.9	ab
Ariz. Sunrise	27.9	ab
56913M	28.1	ab
SR No. 91	30.4	b
CBR No. 1	38.5	c
PMR No. 45	42.6	cd
PMR No. 6	45.0	d
Netted Gem	47.3	d

% of Dead Tips - Main Runner

Variety	% of D.T.	Duncan's .05
56913M	26.8	a
CBR No. 1	38.3	ab
SR No. 91	49.7	bc
PMR No. 6	59.8	cd
PMR No. 88	65.7	d
Netted Gem	65.9	d
PMR No. 450	66.6	d
Ariz. Sunrise	66.9	d
PMR No. 45	78.8	e

% of Dead Tips - Lateral Runner

Variety	% of D.T.	Duncan's .05
56913M	31.4	a
CBR No. 1	38.2	ab
Ariz. Sunrise	44.0	abc
PMR No. 88	50.6	bcd
PMR No. 6	54.2	cd
SR No. 91	55.0	cd
PMR No. 450	57.4	cd
Netted Gem	64.5	d
PMR No. 45	74.6	d

*Any two groups followed by the same letter are not significantly different, based on Duncan's Multiple Range Test. Any two groups not followed by the same letter are significantly different.

Response of Cantaloup Varieties to Calcium and Nitrogen Supply

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Nitrogen, phosphorus and potassium nutrient levels were established for optimum growth of cantaloup plants in greenhouse pot soil cultures using a typical Arizona desert soil. No yield of dry matter response was obtained for potassium or phosphorus content of leaves. The optimum nitrogen level found was considerably in excess of that which is commonly used commercially on soils of the type used in these experiments.

A similarity existed in the symptoms of magnesium deficiency in the greenhouse tests and some of the field symptoms of crown blight in cantaloup. Magnesium deficiency symptoms appeared when the level of magnesium in mature leaves fell to about 0.2 percent on the dry basis. Addition of nitrogen to the soil significantly increased the potassium, calcium and magnesium levels and decreased the phosphorus level in the leaves under conditions of varying ratios of exchangeable soil calcium to magnesium ions.

Limited evidence indicates there are no differences in mineral content associated with variety, but PMR-6, which appears to have other genetic weaknesses, tended to show magnesium deficiency symptoms more severely than PMR-45 or CBR-1, and under conditions which had no effect on the latter two.

Tissue analyses indicated the leaves of plants growing in the field with crown blight were not deficient in magnesium, and analysis of several agricultural soils on which cantaloups have been grown showed ample amounts of exchangeable magnesium to be present.

Tissue analyses and observations in the greenhouse and in the field indicate some of the symptoms of crown blight resemble those of nitrogen deficiency. Plants with crown blight symptoms had less nitrogen in their leaves than did normal appearing plants. Phosphorus in leaves of blighted plants was depleted and appeared to accumulate in the petioles.

Cantaloup Fertilizer Studies

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Fertilizer tests conducted in the 1957 season continue to verify that in many instances relatively heavy (90 and 120 pounds of N per acre) applications of nitrogen significantly improve cantaloup yields. This finding is true whether one compares the 90 and 120 pound treatment with the check (no fertilizer) or the lower rate of 60 pounds per acre.

Aside from the nitrogen effect, there was a noticeable influence on yield associated with the method of applying the fertilizer material. In the case of nitrogen, broadcasting just prior to bedding time without subsequent sidedressing applications was the least effective method. Either sidedressing all the fertilizer in two applications after thinning or a combination of broadcasting prior to planting plus sidedressings after thinning proved to be the superior methods. In this connection, it seemed to make little difference whether urea or ammonium nitrate was used. Each material was equally effective in cantaloup production when the same amounts of nitrogen were used.

Tests with certain chemically mixed (combined) fertilizers -- including ammoniated phosphates -- indicate they produce excellent yields in cantaloups. These results, however, depend to some extent on the method of application of each fertilizer. The differences in response in yield to these fertilizer materials seem to be closely associated with the water solubility of the phosphorous. Fertilizers containing phosphorous of low water solubility produced the poorest yields where the sidedressing method was used. These tests indicated that fertilizers with low water soluble phosphates are most effective when the broadcast application method is followed. On the other hand, those fertilizers containing relatively high water soluble phosphates appeared equally effective, regardless of the method of application. In the case of ammoniated phosphates, the sidedressing method seemed to be superior to the other methods.

In comparing the yields in the various melon size categories involving plots treated with the chemically combined fertilizers, there was some variation in the distribution pattern. However, none of the variations appeared to be sufficiently different to be of practical significance. All of the chemically combined fertilizers tested appeared to produce approximately the same percentages of the various commercial sizes of melons.

In testing the use of the NH_3 (agricultural ammonia) it appeared that the positioning of the injection band was less important than the application of adequate amounts of nitrogen fertilizer following thinning.

Cantaloup Irrigation Studies

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Cooperating with U.S.D.A. - A.R.S. -
Horticultural Crops Research Branch

Detailed irrigation studies with cantaloups have been conducted on the University of Arizona Experimental Farm at Mesa for the past two seasons. These tests indicate several points of interest in relation to yield, size of melons, and incidence of crown blight.

Basically, four (4) treatments were used. They were referred to as very wet, wet, dry, and very dry. Limits of moisture stress were set and measured by the use of irrometers and fiber glass resistance blocks. Two additional treatments were established within treatment four (very dry) to determine plant recovery following severe drought conditions. The limits of these treatments are indicated in Table III.

On the basis of yield, the plants grown under wet plot moisture levels were most productive. This production was not too different from that received from plants on the dry treatment. The difference was not practically significant. Plants grown on the very wet plots yielded significantly fewer marketable melons than either of the two previously mentioned treatments. Production from plants on the very dry plots was poorest.

An evaluation of the data in Table III also shows that the yield from the very dry plots was dominated by the smaller sized melons with over 81% of the production falling into the 45 size melon classification. From a market standpoint, this size is much less desirable than the larger 36 size.

The total yield ranged from 75 crates per acre from the very dry plots to 237 crates per acre from the wet plots. The influence on yield of irrigating severely water stressed plants is shown in Table III.

Recorded notes and pictures indicate a marked difference existed in plant growth and appearance especially with comparisons between the very dry plots and the other three treatments. Plants grown under very wet conditions appeared most vigorous and lush but were noticeably paler in color or, by comparison, were a lighter green than for the plants from the dry and wet plots. Plants from the dry and wet plots did not appear too different one from the other. In both cases, the vines were vigorous and deep-green in color.

The plants in the very dry plots showed typical water stress symptoms. These symptoms appeared different from those of plants which, in the past, had been considered to have crown blight.

To measure recovery from severe water stresses, the test was further extended, later in the season, by adding two treatments in which water was applied to certain portions of the very dry plots. These treatments are referred to as 4a and 4b in Table III. After the plants had gone into a definite water stressed condition for a period of approximately two weeks, an application of water was made. This application was followed by another irrigation about four days later. Within one week, plants in these areas showed a remarkable recovery, both in plant vigor and condition, and sizing of fruit. Yields from

these plots were approximately twice those obtained from the unirrigated portion of the very dry plots. Approximately two weeks following the treatment just described, another portion of the very dry plots was irrigated. This was done to determine the effects of a very late irrigation on plant recovery and yield. Within 10 days, plants receiving this treatment were making rapid growth and had begun to bloom again. It appears from the data in Table III that this late irrigation was too late to improve yield or size of the melons. The melons apparently had reached the stage in development that an irrigation was non-effective in causing growth to resume. Consequently, there were no differences in yield between these and the unirrigated plots.

Leaf counts of 10 entire plants from each of the six (6) treatments were made. Three categories were established; (1) percentage of dead leaves, regardless of cause, (2) percentage of affected leaves, regardless of cause, and (3) percentage of leaves apparently normal.

A comparison of the percentages indicate there was no appreciable difference between any of the treatments. These findings would tend to suggest that irrigation water, as applied in this test, was not influencing the incidence of crown blight.

TABLE III. Effects of Irrigation Levels on Cantaloup Yields

TREATMENT		Yield in Crates per Acre			
No.	Moisture Level	45	36	27	Total
1	VERY WET (Irrometer Reading at irrigation 18-20)	102.8	86.2	5.7	195
2	WET (Irrometer Reading at irrigation 35-40)	95.9	121.9	19.7	238
3	DRY (Irrometer Reading at irrigation 75-80)	94.8	117.3	15.1	227
4	VERY DRY (Fiber glass block reading at irrigation 50 on high range scale)	62.2	12.1	1.2	76
4a	VERY DRY (Irrigation started after plants showed severe drought symptoms for over a 2-week period)	100.3	42.4	1.2	144
4b	VERY DRY (Irrigation started 10 days following treatment 4a above)	62.2	7.8	3.5	74
	L.S.D. at 5%	9.3	32.2	11.0	54.4
	L.S.D. at 1%	12.8	44.5	15.2	75.2

Cantaloup Powdery Mildew

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Horticultural Crops Research Branch
(1957 Experiments)

1. Comparison of Rates and Frequency of Applications of Karathane Dust.

Karathane dust is commonly sold in Arizona as a 3/4 or 1/2% material and growers often apply the dusts weekly when mildew is spreading. For this reason, the experimental dusts contained 1/2% as well as 1% Karathane and some were applied weekly, others were applied at 2-week intervals. All dusts were applied by use of a commercial-type Hardie duster, attached to a tractor.

The treatments were as follows:

Dusts

Karathane ½% weekly
Karathane 1% weekly
Karathane ½% every 2 weeks
Karathane 1% every 2 weeks
Karathane 1% every 2 weeks
Control (no dust)

Dusts were applied at approximately 30 lbs./acre.

Results of the second readings, July 2, showed that plots dusted with Karathane had less mildew than those which received no dust. Dusts containing ½% Karathane were just as effective as those with 1%. Dusting every 2 weeks was as effective as applying dust weekly. These findings were true with the slow build-up of infection that occurred in these plots. If the disease had spread faster and had been more severe, it is possible that greater differences would have been found between weekly and bi-weekly applications, or between ½% and 1% dusts.

2. Effect of Cycloheximide and of Lithium Carbonate Sprays on Incidence of Powdery Mildew.

Cycloheximide sprays were repeated again this year, with and without glycerin. Lithium carbonate, a fungicide, was also applied as an experimental material. Sprays were applied weekly with a knapsack sprayer, wetting the foliage thoroughly.

Sprays

Cycloheximide (Actidione) 2 ppm, or 0.195 grams/2 gal.
Cycloheximide 1 ppm and 1% glycerin, or 0.092 g/2 gal. and 76 ml glycerin.
Cycloheximide 2 ppm and 1% glycerin, 0.195 g/2 gal. and 76 ml glycerin.
Lithium carbonate, 5 lb./100 gal. or 45.4 g/2 gal.
Lithium carbonate, 10 lb./100 gal., or 90.76 g/2 gal.
Control (no spray)

There was no mildew control by the use of sprays, as shown by the lack of any significant differences between treatments.

Virus and Anatomical Studies in Relation to Melons

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Arizona Agricultural Experiment Station

The possible connection between virus infections and the occurrence of crown-blight has been under study for two years. Materials sent to this laboratory by field men continually disclose that severe strains of Western Cucumber mosaic are invariably present in plants having what are believed to be typical crown-blight symptoms, if such can be ascertained.

Cantaloup plants from the Yuma area, collected at different seasons, also show a distinct bronze-vein to bronze-leaf condition and here two viruses have been consistently recovered--tobacco ring-spot and cucumber mosaic (probably Western Cucumber mosaic). Entire plants prematurely collapse.

It is not known yet whether crown-blight symptoms and those of bronze-vein or bronze-leaf can be induced by these mixtures of viruses or whether the viruses get into plants first showing other symptoms. This matter is undergoing further study.

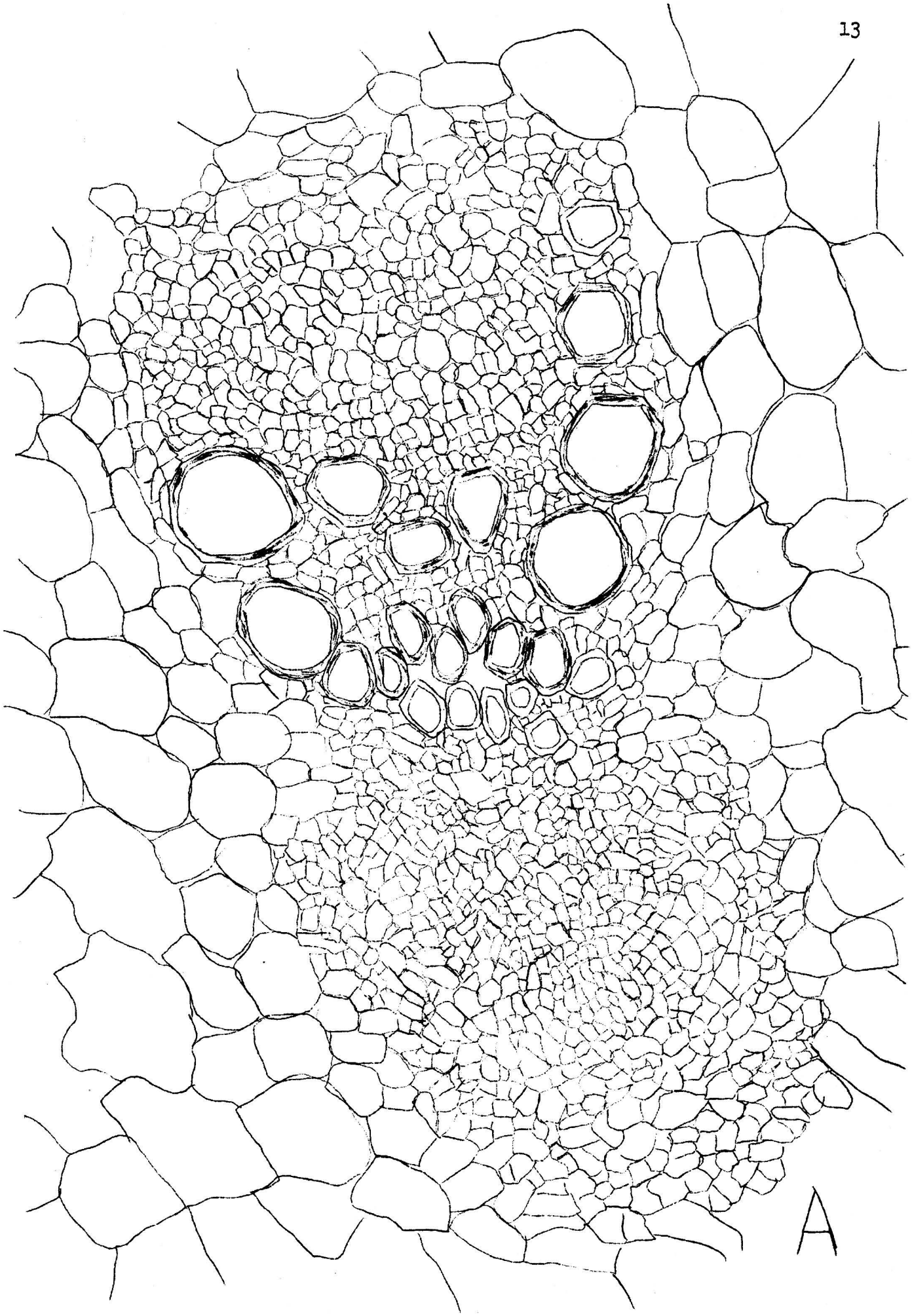
Anatomical studies of crown-blighted and bronze-veined plants, particularly with respect to both collapsed and non-collapsed leaf stalks (petioles) on plants which have had the main leaf portion die, show that the vascular tissues are either enlarged or plugged with foreign substances, or both. The main runners of such plants show modifications of enlargement and plugging. Some of these variations are shown in the drawings on the following pages (figures A, B, and C). Figure A shows the normal "bicollateral vascular bundle" of a petiole from a healthy melon vine. Figure B is a diagrammatic sketch of a bundle from a collapsed petiole, showing very definite obstructing materials in the xylem area (water and mineral conduction) of the plant. This type of material came from plants showing the so-called one-sided streaking of the petiole. Figure C is from an erect and full green-colored petiole below a partially collapsed leaf of melon. In this instance, no xylem plugging is evident but there is great alteration in the form of cells surrounding the xylem. This condition is far from normal.

Figures D and E show some of the various plants susceptible to different mosaic virus strains isolated from cantaloup and honeydew melon vines and fruits in Arizona. Specimens were studied from both the Salt River and Yuma Valleys. All of the combinations shown (arrows indicate the directions of isolations and inoculations in experimental plants) were determined experimentally in a greenhouse under controlled conditions of light and temperatures. In addition, for all intents and purposes the house was virtually insect-proof. The experimental setup is located on the campus of the University at Tucson.

Numerous mosaic and tobacco ring-spot virus strains have been isolated, either separately or in combination from field-infected melon plants. All of these are being maintained "in culture" in various varieties of tobacco (Nicotiana tabacum) which is the main test plant used for such purposes. Some cultures isolated from melon vines in the Yuma area are over two years old. All of the tobacco cultured materials are being used for further studies as to host range, effect on melon vines, etc.

Ring-spot virus, isolated from cantaloup plants from the Gadsen area, was also found to be infecting Wild-or-Tree-tobacco (Nicotiana glauca) and Hubam Clover. The latter plant was found as an escape in a canyon in the mountainous areas of Northern Arizona.

(Figures A-E, inclusive, follow.)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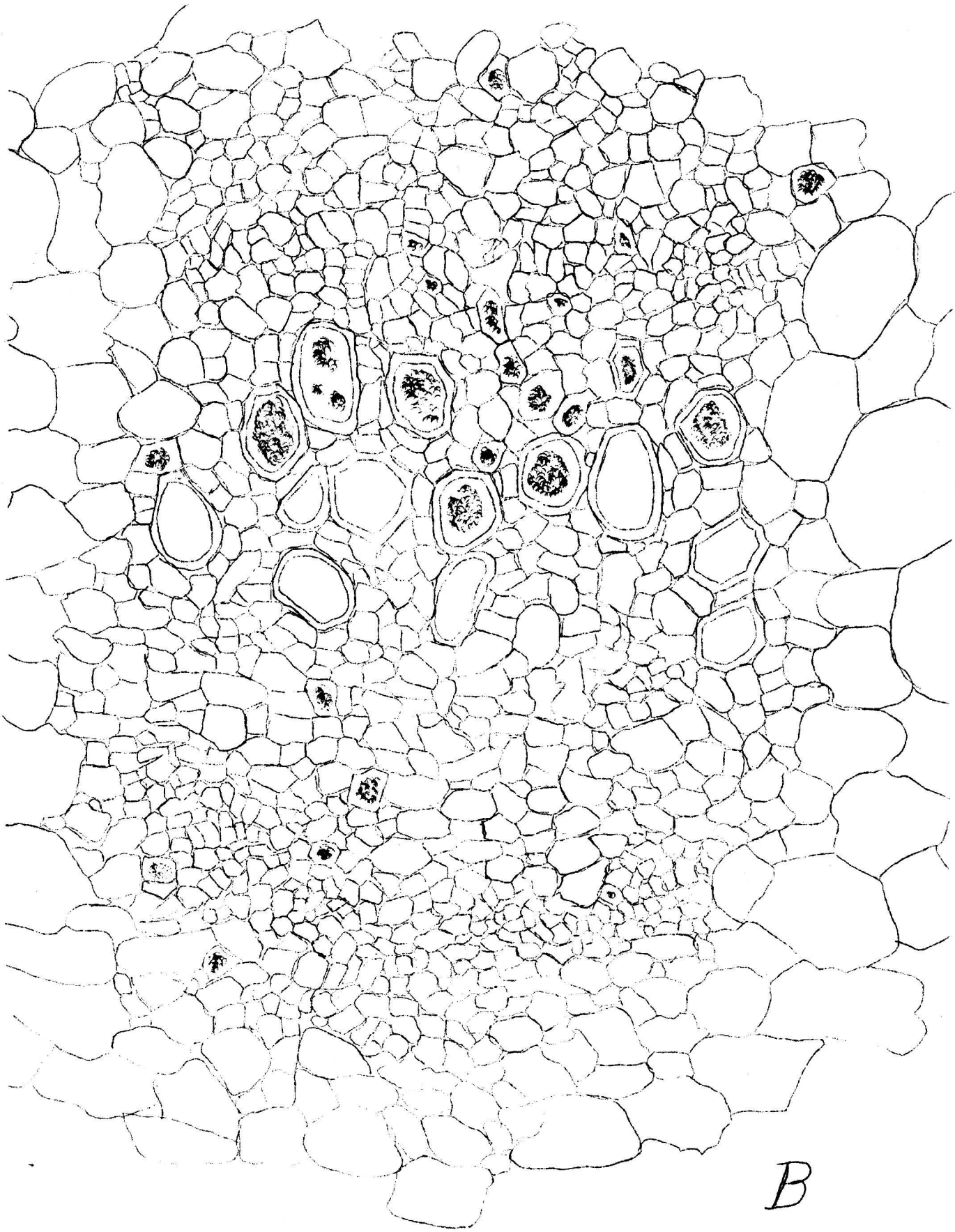
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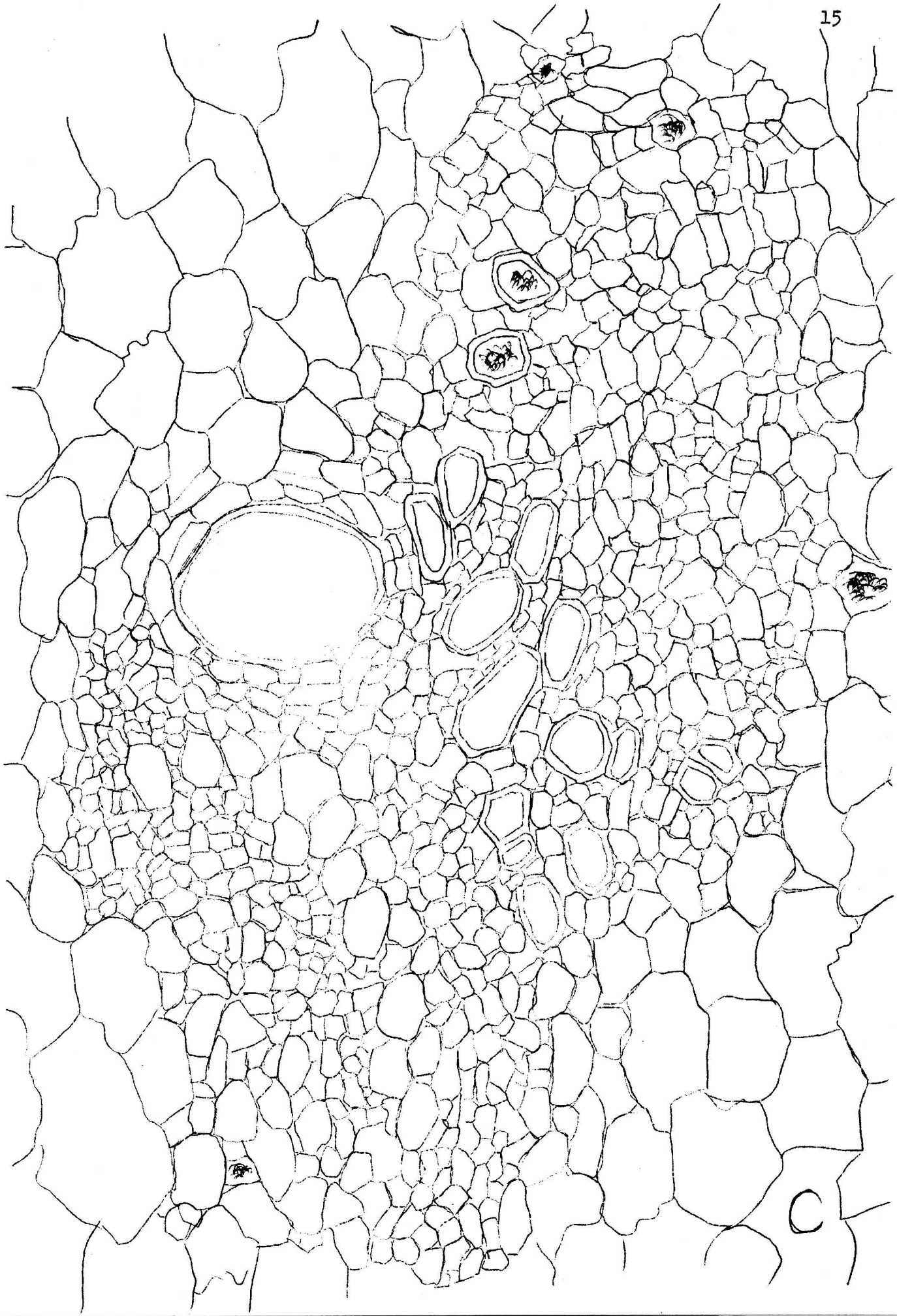
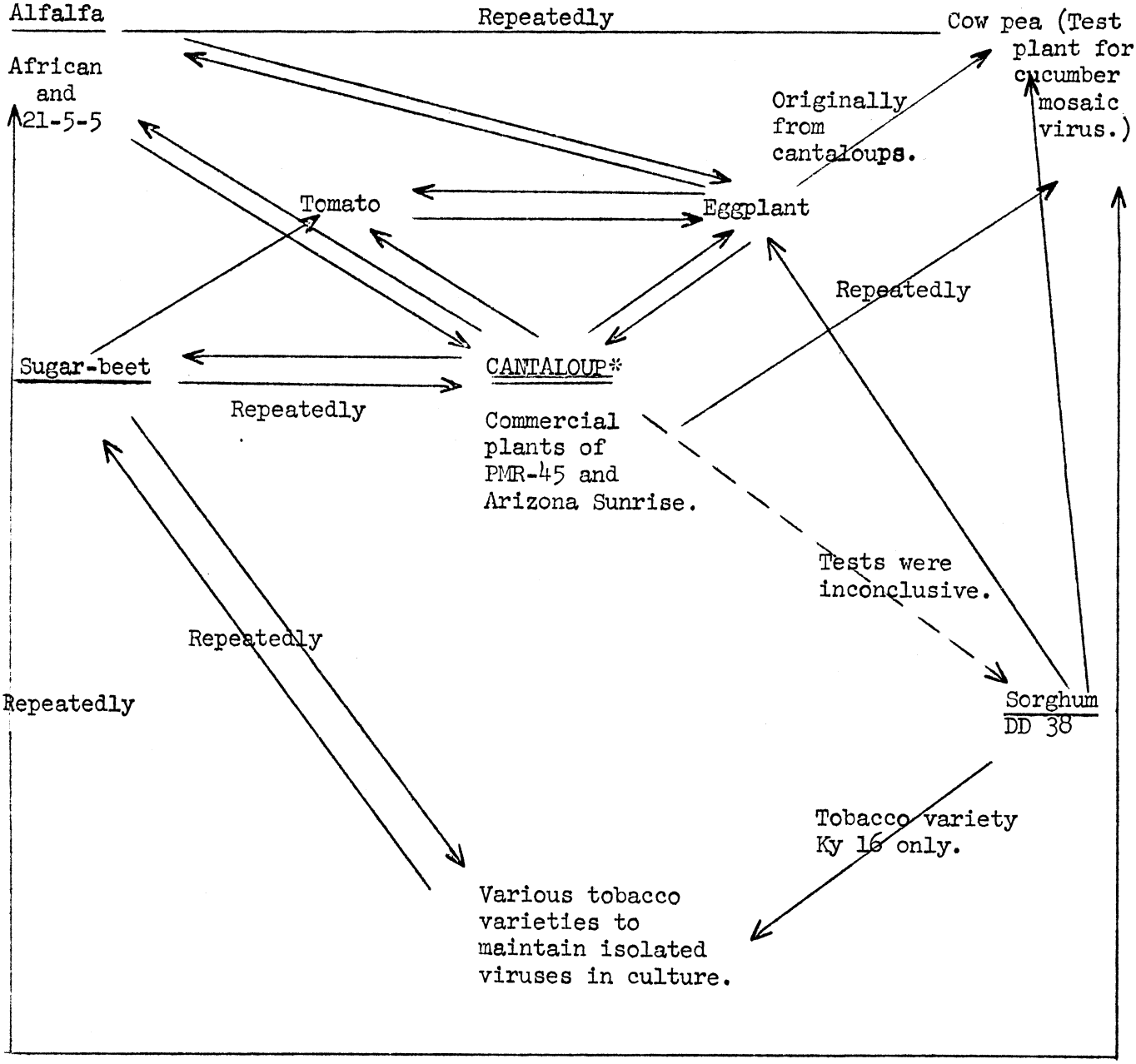

C

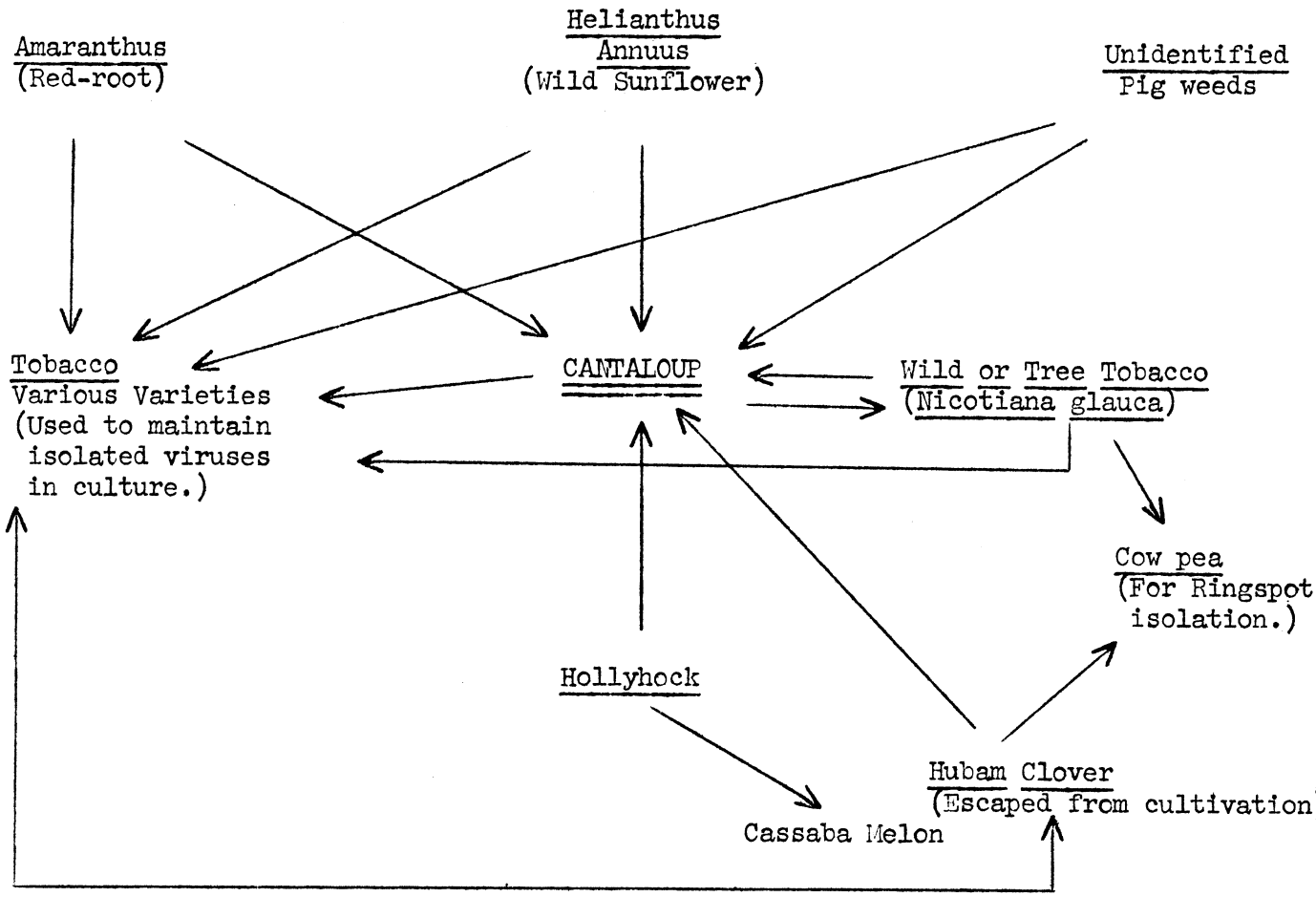
FIGURE D. SOME CROP PLANTS ATTACKED BY CUCUMBER MOSAIC AND OTHER MELON VIRUSES IN ARIZONA.



Experimental transfers made in directions indicated by ARROWS.

*In 1956, commercially planted cantaloups in the Gadsen area showed reactions tentatively called Bronze-vein or Bronze-leaf. These plants contained in addition to cucumber mosaic, tobacco ring-spot virus. Such mixed virus infections are rather common in Arizona melon vines and in tomatoes, peppers and potatoes.

FIGURE E. SOME ARIZONA WEED HOSTS OF MELON MOSAICS AND RING-SPOT VIRUSES



All combinations possible in directions of Arrows and based on experiments.

INVESTIGATIONS OF INSECTS AFFECTING CANTALOUPS IN ARIZONA--1956-57

Orin A. Hills, Entomology Research Division, Agr. Res. Serv., U. S. Dept. of Agriculture, and Donald M. Tuttle, Entomology Department, University of Arizona.

During 1956 and 1957 the U.S.D.A. and the University of Arizona cooperated in conducting small plot experiments for the control of insects affecting cantaloups. Plots were located on the University experiment farms at Mesa and Yuma. In addition, insecticide tests and studies on insect populations and field conditions were conducted in fields of cantaloups in both the Salt River and Yuma Valleys.

In 1956, tests at Mesa were with Thimet as a seed soak, as a spray in the seed row, as granules under the seed, and as a foliage spray; with demeton, Phosdrin, Bayer 19639, and Hercules 528 as foliage sprays; and with parathion as a foliage dust. The principal insects occurring in the plots were dipterous leaf miners. Thimet granules under the seed gave almost complete protection of seedlings from attack of these insects. The spray in the seed row was almost as good, but the seed soak reduced germination and did not give as good leaf miner control. All foliage sprays as well as the parathion dust reduced leaf miner damage. The need for further studies on timing of insecticide applications to increase their efficiency was indicated.

Insecticide tests on cantaloups at Yuma in 1956 were entirely with foliage sprays against leaf miners. Thimet, demeton, and parathion all reduced injury, but parathion was better than the other two.

The 1957 plots at Mesa were arranged to test further the efficiency of granular Thimet under the seed in controlling leaf miners, as well as to compare various insecticides as foliage sprays after the effectiveness of the granules under the seed had disappeared. The granular Thimet protected the plants from leaf miner attack as in 1956, but populations were so low that foliage applications were made only for residue determinations.

At Yuma in 1957, 14 varieties of cantaloups, including Crenshaw and Honeydew, and one variety of cucumber were planted in experimental plots to compare their susceptibility to leaf miner attack. Leaf miner populations were low and no differences in insect injury between varieties of cantaloups was noted, but cucumbers were damaged slightly less than the melons.

Tests were also made at Yuma in 1957 to compare Thimet and Bayer 19639 as seed treatments and as granules under the seed for protection of cantaloups against leaf miners and other insects. Infestations were too low for comparison of insect control, but no plant injury due to treatment resulted.

Studies in commercial plantings of cantaloups in the Salt River and Yuma Valleys in 1956 showed leaf miners to be the most important insect pest of the crop that year. In some fields in the Salt River Valley, parasites were sufficiently numerous to reduce injury, but control was required in most fields. Insects reared from infested leaves collected before and after insecticide applications indicated that well-timed applications were effective in reducing leaf miner injury and did not adversely affect the ratio of leaf miners to parasites. In the Yuma Valley, leaf miners severely affected many cantaloup fields as the crop approached maturity. An unreplicated field test indicated that one or two applications of parathion would have been advantageous.

In 1957, insects were of minor importance in cantaloups in the Salt River Valley, and also in the Yuma Valley except as vectors of virus diseases. Some fields in the Yuma area were infested with green peach aphids between March 5 and April 11. These insects cannot live long on cantaloups, and cause little feeding, but they are vectors of several virus diseases, including some of the mosaics. On May 2, some of the fields in this area were showing such severe mosaic symptoms that no melons were harvested.

In some years, curly top, transmitted by the beet leafhopper, has been a serious disease of cantaloups in the Salt River Valley. Insect populations were measured weekly in the Yuma area in 10 representative study fields in 1956 and in 13 fields in 1957. Stickey-board traps were maintained during the cantaloup season to detect insect flights. In addition, surveys were made on weeds within the cultivated area and surrounding desert and samples of leafhoppers taken for curly-top virus tests. In both years, leafhopper populations were found to be low in cantaloup fields, and traps indicated no marked movement. The desert surrounding Yuma was found to be unproductive of beet leafhoppers. Weeds within the cultivated areas held the insects overwinter and served as breeding hosts in the early spring. Samples of the leafhopper population on these weeds indicated that less than one percent were carrying the curly-top virus. It appears from these 2 years' observations that curly top would be a minor factor in cantaloup production in the Yuma area, but observations over a longer period are necessary before any conclusion can be drawn.